**Cell Growth and Reproduction Review Sheet**

**Chromosomes**

* During cell division the cell organizes the genetic material into chromosomes.
* The DNA wraps around histone proteins and coils tightly into an X unit.
* The two chromatid arms are held together by a centromere.
* Every species has a set # of chromosomes in body cells called the diploid (*2n*) number.

The gamete cells have half as many (*n*) called the haploid number.

* The chromosomes that occur in homologous pairs are called autosomes.
* The sex chromosomes, X and Y, determine gender.
* A karyotype is a picture of the chromosomes that can specify gender

and if a person has an abnormality that would cause a disorder.

* Two different species are not capable of breeding in the wild and making

a viable offspring because they do not have homologous pairs.

**Cell Division**

* The Cell cycle includes interphase, the M (mitosis) phase and cytokinesis.
* Interphase is a period of growth and development for the cell. It has 3 stages.
* In the G1 (Gap 1) stage the size doubles and organelles are made.
* In the S (Synthesis) stage the DNA is replicated.
* In the G2 (Gap 2) stage the cell grows more and replicates organelles.
* Mitosis involves nuclear cell division.
* In Prophase the spindle forms and the DNA condenses into chromosomes.
* In Metaphase the chromosomes attach to the spindle and line up in middle.
* In Anaphase the chromosomes split and are reeled in to the centrioles.
* In Telophase the nucleus reforms around the unreplicated chromosomes.
* Cytokinesis involves division of the cytoplasm.
* There are checkpoints that exist after certain events to ensure correct development.
* Some cells no longer divide and enter a G0 stage; ex. – nerve cells.
* Cells can go through uncontrolled division and cancer could result.

**Meiosis**

* Meiosis is a special type of cell division that occurs in gamete cells. It is preceded by

interphase and involves a double set of divisions.

* The first round of divisions gets the chromosomes into the haploid form.
* In Prophase I synapsis groups the chromosomes into homologous pairs

and crossing over occurs between chromatids.

* In Metaphase I the chromosome pairs line up in the middle. Independent

assortment occurs because they separate randomly.

* After Telophase I two cells contain haploid, replicated chromosomes.
* The second round of divisions makes unreplicated chromosomes forming into gametes.
* After Telophase II four cells form with haploid unreplicated chromosomes
* During spermatogenesis four sperm cells form at the end of meiosis while in oogenesis

one large egg with most of the cytoplasm forms and three polar bodies die.

* If meiosis does not occur correctly non-disjunction occurs and cells are produced with

more or fewer chromosomes compared to the normal haploid species number.

**Genetics Review Sheet**

**Mendel’s Work**

* Gregor Mendel is considered the father of genetics because of his work breeding pea

plants. He grew hundreds of plants and showed complete dominance inheritance.

* He let plants self-pollinate for several generations until he obtained 14

strains of pure plants. He called this the P1 generation.

* He cross-pollinated these plants and obtained an F1 generation that

displayed only the dominant form of the trait but was heterozygous.

* He then let these plants self-pollinate to produce the F2 generation. He

observed a 3 to 1 ratio of dominant to recessive traits occurring.

* Today Mendel’s factors are called alleles. A dominant allele is represented by a capital

letter and the recessive is represented by a lowercase form of the same letter.

* Mendel proposed two laws to explain the patterns he observed.
* The Law of Segregation to explain that only one of the two alleles that

are present for a trait gets passed on in gamete formation during meiosis.

* The Law of Independent Assortment states that genes on different

chromosomes are not inherited together.

**Genetic Crosses – Patterns of Inheritance**

* The genotype is the genetic makeup specified by the combination of alleles and the

phenotype is the physical appearance based on this combination.

* The simplest inheritance pattern is called complete dominance because one allele

completely masks the other.

* The homozygous dominant and heterozygous phenotypes are the same.
* There can only be two phenotypes, one form or the other expressed.
* The pattern of incomplete dominance occurs when one allele is dominant over the other

but does not completely mask it.

* A capital and lowercase form of the same letter is used.
* The heterozygous combination results in a blending of the other forms.
* The pattern of codominance occurs when each allele is equally dominant.
* There are no recessive forms so two different capital letters are used.
* The heterozygous form displays both dominant forms in an even amount.
* The sex linked pattern is used for traits that occur on the X or Y chromosome.
* A capital and lowercase superscript are used with the X.
* Only females are heterozygous and males have recessive traits more often.
* The multiple allele pattern occurs when there is more than one dominant form that

masks a recessive form.

* A capital letter with superscripts and a lowercase form of the same

letter are used for the alleles.

* The polygenic pattern involves more than one gene with at least two alleles each to

specify the trait.

* A dihybrid cross can be done to show the frequency that two traits would be inherited

in with different combinations.

* There are two traits coded for by two different genes.
* There are always four phenotypes: both dominant, one dominant one

recessive, one recessive one dominant and both recessive.